Name: AP Chemistry

Atomic Theory Quiz

1. What is the dual nature of light?

2. Which of the following electron configurations is incorrect? Give the correct electron configuration.
   (a) Carbon = $1s^2 2s^2 2p^2$
   (b) Sulfur = $1s^2 2s^2 2p^6 3p^6$
   (c) Tantalum = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 5d^3$
   (d) Nickel = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4d^8$

3. Match the following conclusions to the appropriate scientists of atomic theory or the different theories to their appropriate definition.

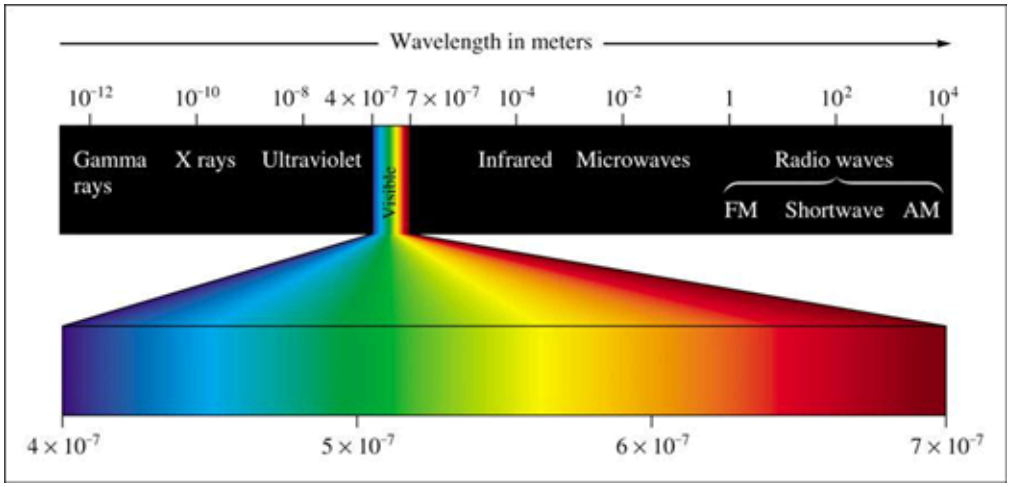
a. ___ Louis de Broglie	1. scheme used to reproduce the electron configuration of the ground states of atoms by successively filling sublevels in a specific order
b. ___ Pauli exclusion principle	2. all matter has both particulate and wave properties
c. ___ Hund's rule	3. energy has particulate properties
d. ___ Albert Einstein	4. electron has to placed in the same orbital with parallel spins before pairing electrons
e. ___ Aufbau principle	5. no two electrons can have the same quantum numbers
f. ___ Max Planck	6. all electromagnetic radiation is quantized

4. Describe Bohr's model and the quantum mechanical model. Contrast the two models, including the issues with Bohr's model.

5. Which of the following sets of quantum numbers is unacceptable? They are listed in the following order: n, *l*, m_l , m_s.
   - ○ A. 2, 0, 0, -1/2
   - ○ B. 3, 0, 1, -1/2
   - ○ C. 3, 0, 0, -1/2
   - ○ D. 3, 1, 1, +1/2
   - ○ E. 4, 3, -2, +1/2
6. For the following electron configurations, draw the orbital diagram, determine if they are in the ground or excited state and identify the element.

   (a) $1s^2 2s^2 2p^6 3s^2 3p^3$
   (b) $1s^2 2p^4$

7. One type of electromagnetic radiation has a frequency of 107.1 MHz, another type has a wavelength of 2.12 x 10^{-10} m, and another type of electromagnetic radiation has an energy of 3.97 x 10^{-19} J. Identify each type of electron radiation using the diagram below and place them in order of increasing energy.



8. (a) Calculate the energy emitted from the transition n = 4 to n = 2.
   (b) What is the wavelength associated with this energy and what type of electromagnetic radiation is this?

9. One of the emission lines that provides the green color in fireworks, which comes from barium salts, has a wavelength of 505 nm.

   (a) Determine the frequency of this green line.
   (b) Determine the energy associated with this green line.
   (c) How does this emission line compared to a blue emission in terms of wavelength, frequency, and energy?